

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
16 October 2003 (16.10.2003)

PCT

(10) International Publication Number  
**WO 03/084368 A1**

(51) International Patent Classification<sup>7</sup>: **A47C 27/00**

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(21) International Application Number: PCT/KR03/00673

(22) International Filing Date: 4 April 2003 (04.04.2003)

(25) Filing Language: Korean

(26) Publication Language: English

(30) Priority Data:  
10-2002-0019584 4 April 2002 (04.04.2002) KR  
10-2002-0022838 25 April 2002 (25.04.2002) KR

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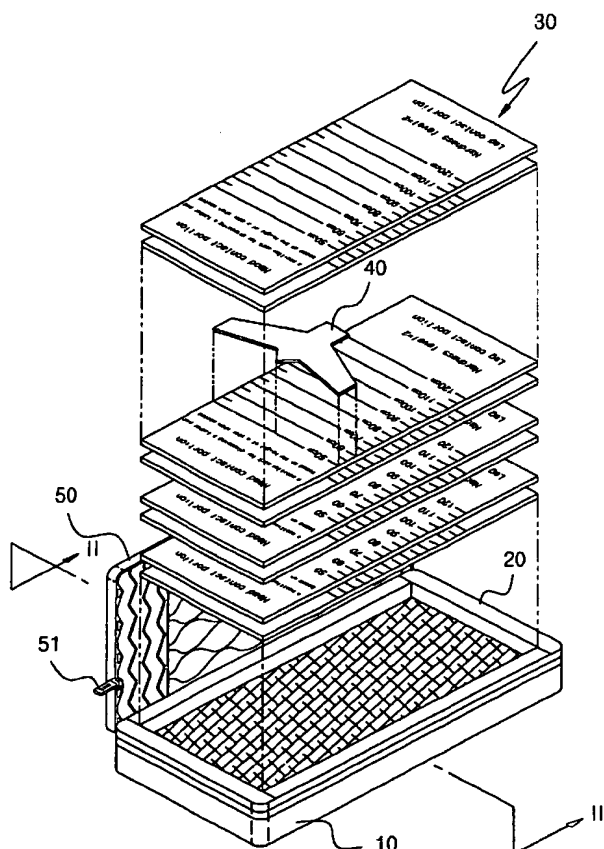
(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

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(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,

[Continued on next page]

(54) Title: MATTRESS WITH ADJUSTABLE HARDNESS



(57) Abstract: Disclosed herein is a mattress whose hardness is adjustable based on physical characteristics of a user. The mattress comprises a base mat, which forms a lower part of the mattress. A guide mat is attached to the base mat along the upper edges thereof. In an inner space defined by the guide mat, a plurality of hardness adjusting mats are stacked one on top of another on the base mat. The hardness adjusting mats have different hardnesses, and the hardness of the mattress is adjusted by changing a stacking order of the hardness adjusting mats. Between one of the hardness adjusting mats and a neighboring hardness adjusting mat is interposed a lumbar pad. A mattress cover is provided for shielding the hardness adjusting mats and the guide mat.



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ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO,  
SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM,  
GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

**Published:**

— *with international search report*

## MATTRESS WITH ADJUSTABLE HARDNESS

## Technical Field

5           The present invention relates to a mattress, and more particularly to a mattress whose hardness is adjustable based on physical characteristics of a user.

## Background Art

10

As well known to those skilled in the art, a mattress comprises a body filled with various stuffing materials, such as latex foam, urethane foam, natural fibers, etc., and several cushion springs and wood members disposed in  
15 the body. The mattress has a size sufficient for a person to have a sleep thereon.

However, the conventional mattress is usually made regardless of physical characteristics of a user. For example, the conventional mattress has only a fixed  
20 hardness. As a result, the user may be uncomfortable when he/she sleeps on the mattress for a long time.

If the mattress has low hardness, the buttocks and the trunk of a user's body, which exert high pressures against the surface of the mattress, sink deep into the  
25 mattress. Especially, a lumbar portion of the user's body sinks deeper into the mattress since the lumbar portion is relatively heavier than other portions of the body. Consequently, there is generated tension between one lumbar vertebra and a neighboring lumbar vertebra. If the user  
30 sleeps for a long time while such tension is generated at his/her lumbar portion, he/she may fail to have a good sleep. Furthermore, he/she may feel a pain after having the sleep, and may not properly move his/her body for quite a while.

35           On the contrary, if the mattress has high hardness,

the buttocks and the trunk of the user's body, which exert high pressures against the surface of the mattress, sink only slightly into the mattress. At this time, the lumbar portion of the user's body sinks more slightly into the mattress than other portions of the body, or the lumbar portion of the body does not even make contact with the mattress. As a result, there is generated compression between one lumbar vertebra and a neighboring lumbar vertebra. If the user sleeps for a long time while such compression is generated at his/her lumbar portion, he/she may also fail to have a good sleep, in the same manner as described above.

Above and beyond the aforesaid health issues, a mattress with different hardness is needed every season. In other words, a mattress with high hardness, i.e., a mattress having a small contact area between the user's body and the surface of the mattress is needed in summer since a person sweats in summer. On the contrary, a mattress with low hardness, i.e., a mattress having a large contact area between the user's body and the surface of the mattress is needed in winter to increase the heat-insulating effect. However, it is not possible to adjust hardness of the conventional mattress due to the structure of the mattress, which requires the mattress itself to be replaced if necessary.

In order to solve the aforesaid problems, a mattress has been proposed in which a plurality of auxiliary mats having hardness different from the hardness of the mattress itself are piled up on the mattress one by one to adjust the hardness of the mattress. The auxiliary mats are classified by sexes, measurements (for example, standing and seated heights), and ages of users, which are further classified by hardness.

The aforesaid mattress has advantages in that a properly fitted mattress can be provided to a user since the auxiliary mats are made on the basis of physical

characteristics of the user. On the contrary, the mattress has disadvantages in that it is difficult to easily manage various mattresses equipped with various auxiliary mats since the auxiliary mats are excessively classified on the basis of the physical characteristics of the user, and to select auxiliary mats suitable to the physical characteristics of the user. Furthermore, it is difficult to manufacture, store and distribute various mattresses with adjustable hardness classified by the aforesaid auxiliary mats.

Even if a user selects and uses a mattress with appropriate hardness, however, all of the auxiliary mats must be replaced whenever the physical characteristics of the user change, as in the case where the user is a child or a teenager in a growth period.

Moreover, it is required that a portion of a mattress on which a lumbar portion of a user's body is laid has hardness different from hardnesses of other portions of the mattress. However, it is not possible to adjust hardness in the aforesaid conventional mattress.

#### Disclosure of the Invention

Therefore, the present invention has been made in view of the above problems, and it is an object of the present invention to provide a mattress, hardness of which is easily adjustable based on physical characteristics of a user, the number of kinds of which are reduced so that production, storing, distribution, and a user's selection of the mattress are simple and convenient, replacement of which is very easy on the basis of changes of physical characteristics of the user, and hardness of which is freely adjustable for each portion of the human body.

In accordance with one aspect of the present invention, the above and other objects can be accomplished

by the provision of a mattress comprising: a base mat, the base mat forming a lower part of the mattress; a guide matt attached to the upper edges of the base mat; a plurality of hardness adjusting mats stacked one on top of another on the base mat in an inner space defined by the guide matt, the hardness adjusting mats having different hardnesses, the hardness of the mattress being adjusted by changing a stacking order of the hardness adjusting mats; a lumbar pad interposed between one of the hardness adjusting mats and a neighboring hardness adjusting mat; and a mattress cover for shielding the hardness adjusting mats and the guide matt.

Preferably, each of the hardness adjusting mats may have position marks for indicating portions of the mattress where a head and legs of a user's body are laid, respectively, a hardness indication for indicating a degree of hardness of the mattress, and guidelines for indicating positions for disposing the lumbar pad based on the height of the user when seated, the position marks, the hardness indication, and the guidelines being indicated on the top surface of each of the hardness adjusting mats.

In accordance with another aspect of the present invention, there is provided a mattress with adjustable hardness, comprising: a base mat, the base mat forming a lower part of the mattress; a guide matt attached to the upper edges of the base mat; a plurality of hardness adjusting block mats arranged side by side on the base mat in an inner space defined by the guide matt, the hardness adjusting block mats having different hardnesses, the hardness of the mattress being adjusted by changing an arranging order of the hardness adjusting block mats; and a mattress cover for shielding the hardness adjusting block mats and the guide matt.

Preferably, each of the hardness adjusting block mats may have a plurality of pads stacked one on top of another, the pads having different hardnesses, and each of the

hardness adjusting block mats may have toothed longitudinal sides so that one of the hardness adjusting block mats is engaged with a neighboring hardness adjusting block mats by means of their respectively engaging toothed longitudinal sides.

Preferably, each of the hardness adjusting block mats may have a plurality of pads stacked one on top of another therein, the pads having different hardnesses.

Preferably, each of the hardness adjusting block mats may have toothed longitudinal sides so that one of the hardness adjusting block mats is engaged with a neighboring hardness adjusting block mats by means of their respectively engaging toothed longitudinal sides.

Preferably, the mattress with adjustable hardness further comprises: a computer program and a handbook, both of which provide the user with optimum combination forms of the hardness adjusting mats or optimum arrangement forms of the block mats based on the physical characteristics of the user.

Preferably, the mattress with adjustable hardness further comprises a zipper, velcro strips, or a fastener attached to one side of the outer circumference of the mattress cover and the corresponding side of the outer circumference of the base mat for detachably joining the mattress cover to the base mat.

Preferably, the guide matt may be made of cushion materials having a hardness of 20 kg/314 cm<sup>2</sup> to 70 kg/314 cm<sup>2</sup> and a width of 5 mm to 150 mm, the value of the hardness being a 25 % indentation load deflection (ILD) measured according to the provision of JIS-K-6401.

#### Brief Description of the Drawings

The above and other objects, features and other advantages of the present invention will be more clearly understood

from the following detailed description taken in conjunction with the accompanying drawings, in which:

Fig. 1 is an exploded perspective view of a mattress with adjustable hardness according to a preferred embodiment of the present invention;

Fig. 2 is a longitudinal sectional view taken along line II-II of Fig.1;

Fig. 3 is a front view showing an example of a hardness-adjusting mat of the present invention;

Fig. 4 is a view showing a pressure exerted by a lumbar portion of a person on the surface of a general mattress;

Fig. 5 is a view showing a positional relation between a human body and a lumbar pad of the present invention during sleep;

Fig. 6 is a perspective view of a double mattress with adjustable hardness of the present invention;

Fig. 7 is an exploded perspective view of a mattress with adjustable hardness according to another preferred embodiment of the present invention;

Fig. 8 is a perspective view of a block mat having toothed longitudinal edges; and

Fig. 9 is an exploded perspective view of a mattress with adjustable hardness according to still another preferred embodiment of the present invention.

#### Best Mode for Carrying Out the Invention

##### First preferred embodiment

As shown in Figs. 1 and 2, a mattress according to a first preferred embodiment of the present invention comprises a base mat 10, which forms a lower part of the mattress. A guide matt 20 is attached to the base mat 10 along the upper edges thereof. In an inner space defined by the guide matt 20, a plurality of hardness adjusting



mats 30 are stacked one on top of another on the base mat 10. Between one of the hardness adjusting mats 30 and a neighboring hardness adjusting mat 30 is interposed a lumbar pad 40 for supporting a lumbar portion of a user's body. The lumbar pad 40 is disposed on one of the hardness adjusting mats 30 at a position for disposing the lumbar pad 40 based on the height of the user when seated. On the hardness adjusting mats 30 is disposed a mattress cover 50 for shielding the hardness adjusting mats 30 and the lumbar pad 40.

The base mat 10 is made up of a common mattress comprising a body filled with various stuffing materials, such as latex foam, urethane foam, natural fibers, etc., and several cushion springs and wood members disposed in the body. The base mat 10 has a size sufficient for a person to have a sleep thereon.

The guide matt 20 is detachably attached to the base mat 10 along the upper edges thereof. To this end, velcro strips, a zipper, or a fastener may be attached to contact areas of the base mat 10 and the guide matt 20. For example, velcro strips are attached to the contact areas of the base mat 10 and the guide matt 20, respectively, as shown in Figs. 1, 2 and 6. When the guide matt 20 is attached to the base mat 10 along the upper edges thereof, an inner space is defined on the base mat 10 by the guide matt 20. In the inner space defined by the guide matt 20 are stacked a plurality of the hardness adjusting mats 30 one on top of another on the base mat 10. Preferably, the guide matt 20 is made of cushion materials having a hardness of 20 kg/314 cm<sup>2</sup> to 70 kg/314 cm<sup>2</sup>, which is a 25 % indentation load deflection (ILD) measured according to the provision of JIS-K-6401, and a width of 5 mm to 150 mm, so that the guide matt 20 stably supports the hardness adjusting mats 30 stacked inside the guide matt 20.

The hardness adjusting mats 30 have hardness different from the hardness of the base mat 10, and the

hardness of the mattress is adjusted by changing a stacking order of the hardness adjusting mats 30.

Specifically, a mattress with low hardness is obtained by putting the hardness adjusting mats 30 with low hardness on top of the hardness adjusting mats 30 with high hardness. On the contrary, a mattress with high hardness is obtained by putting the hardness adjusting mats 30 with high hardness on top of the hardness adjusting mats 30 with low hardness. Therefore, the hardness of the mattress can be minutely adjusted by providing the hardness adjusting mats 30 having various values of hardness. Preferably, between 3 and 15 sheets of the hardness adjusting mats 30 may be stacked one on top of another so that the hardness of the mattress is properly adjusted.

As shown in Fig. 3, on the top surface of each of the hardness adjusting mats 30 are indicated position marks 31 and 32 for indicating portions of the mattress where a head and legs of a user are laid, respectively, a hardness indication 33 for indicating a degree of hardness of the mattress, and guidelines 34 for indicating positions for disposing the lumbar pad 40 based on the height of the user when seated.

In another example of the hardness adjusting mats 30, each of the hardness adjusting mats 30 may comprise a head contact portion having a fixed hardness, a lumbar contact portion having hardness different from the hardness of the head contact portion, and a leg contact portion having hardness different from the hardness of the head contact portion and the hardness of the lumbar contact portion. The head, lumbar, and leg contact portions are partitioned by the marks. When each of the hardness adjusting mats 30 is made up, the mattress of the present invention has advantages in that the mattress having variable hardness suitable to each of the portions of the human body can be provided only using a single sheet of hardness adjusting mats 30.

The lumbar pad 40 is interposed between one of the hardness adjusting mats 30 and a neighboring hardness adjusting mat. The lumbar pad 40 is disposed on one of the hardness adjusting mats 30 at a horizontal position for disposing the lumbar pad 40 based on the height of the user when seated, which is indicated by the guidelines 34 on each of the hardness adjusting mats 30. It is preferable to manufacture the lumbar pad 40 in a pattern similar to the lumbar pressure distribution indicated by a lumbar pressure distribution graph on the surface of the mattress, as shown in Fig. 4, so that the lumbar pad 40 can most effectively support a lumbar portion of the user.

The lower end of the lumbar pad 40 is disposed on one of the guidelines 34 corresponding to the height of the user when seated to determine a horizontal position of the lumbar pad 40 on the hardness adjusting mats 30. Subsequently, the lumbar pad 40 is interposed between one of the hardness adjusting mats 30 and a neighboring hardness adjusting mat 30, by which the user feels the greatest comfort. In this way, the hardness of the lumbar contact portions of the hardness adjusting mats 30 can be simply and easily adjusted.

A plurality of lumbar pads 40 with different hardnesses may be provided for further minutely adjusting the hardness of the lumbar contact portions of the hardness adjusting mats 30. In this case, each of the lumbar pads 40 is interposed between one of the hardness adjusting mats 30 and a neighboring hardness adjusting mat 30.

Using the lumbar pad or pads 40 according to the present invention eliminates a need for replacing the whole mattress as in the prior art, since it is sufficient to change a position for disposing the lumbar pad 40 based on the height of the user when seated as time goes by, as in the case where the user is a child or a teenager in a growth period.

It can be seen from Fig. 5 that the lumbar portion of

the user is effectively supported by the lumbar pad 40 which is manufactured in a form similar to the lumbar pressure distribution and which is disposed on the corresponding guideline 34 based on the height of the user when seated.

It is easily understood from the above description that a mattress with desired hardness can be provided by changing a stacking order of the hardness adjusting mats 30 and the lumbar pad 40. Consequently, the mattress according to the present invention can be manufacture in a small number of types thereof than the conventional mattress, whereby production, storing, distribution, and a user's selection of the mattress are simple and convenient.

Although the user can change the stacking order of the hardness adjusting mats 30 and the lumbar pad 40 by himself/herself to adjust the hardness of the mattress as described above, the mattress according to the present invention further comprises a computer program and a handbook, both of which provide the user with optimum values of the hardness of the hardness adjusting mats 30 and optimum combination forms of the hardness adjusting mats 30 and the lumbar pad 40 based on the physical characteristics of the user so that the user can adjust the hardness of the mattress more accurately.

The computer program comprises a data storing unit for storing optimum combination forms of the hardness adjusting mats 30 and the lumbar pad 40 based on the physical characteristics of the user, an input unit for inputting his/her physical characteristics by the user, a controller for comparing the physical characteristics of the user inputted from the input unit with the data stored in the data storing unit to search for a combination form of the hardness adjusting mats 30 and the lumbar pad 40 suitable to the physical characteristics of the user, and an output unit for displaying the combination form searched by the control means so that the user may see the

combination form.

The physical characteristics of the user inputted from the input unit are principal factors for determining hardness of the hardness adjusting mats 30, such as sex of  
5 a user, height of the user when standing, height of the user when seated, weight of the user, age of the user, chest measurement of the user, waist measurement of the user, hip measurement of the user, thigh measurement of the user, calf measurement of the user, shoulder width of the  
10 user, front-to-back waist length of the user, front-to-back chest length of the user, front-to-back belly length of the user, front-to-back head length of the user, side-to-side head width of the user, head measurement of the user, height to the back of the neck of the user when seated,  
15 height to the shoulder of the user when seated, and height to the waist of the user when seated. The user measures the aforesaid physical measures by himself/herself to input them to a computer.

In the data storing unit are previously stored  
20 optimum combination forms of the mattress obtained by experiments based on various data related to the physical measures. The physical measures forming the basis of the data are preferably provided on the basis of the Korean national physical standards. For example, a mattress for a  
25 Korean person may be manufactured on the basis of the physical measurements obtained by a human body measuring method of the Korean Agency for Technology and Standards.

If the computer is not available, the handbook can be effectively utilized. The handbook provides the user with  
30 optimum combination forms of the hardness adjusting mats 30 and the lumbar pad 40 based on the physical characteristics of the user. The user can search for a combination form of the hardness adjusting mats 30 and the lumbar pad 40 suitable to his/her physical characteristics in the  
35 handbook to easily adjust hardness of the mattress.

In this way, it is possible for the user to

accurately adjust hardness of the mattress suitable to his/her physical characteristics using the aforesaid computer program or the aforesaid handbook. Furthermore, it is possible for the user to quickly adjust the hardness of the mattress suitable to his/her physical characteristics even without having to perform several trials and errors.

The mattress cover 50 is attached along the upper edges of the base mat 10 in such a manner that the mattress cover 50 shields the upper parts of the hardness adjusting mats 30 and the guide matt 20. To this end, a zipper, velcro strips, or a fastener for detachably joining the mattress cover 50 to the base mat 10 may be attached to one side of the outer circumference of the mattress cover 50 and the corresponding side of the outer circumference of the base mat 10. In this embodiment, a zipper 51 is attached to one side of the outer circumference of the mattress cover 50 and the corresponding side of the outer circumference of the base mat 10.

Therefore, the hardness adjusting mats 30, the lumbar pad 40, and the guide matt 20 disposed inside the mattress cover 50 can be protected from any external shock by means of the mattress cover 50 with the result that displacement or damage of the hardness adjusting mats 30, the lumbar pad 40, and the guide matt 20 is prevented.

The present invention may be also realized by a double mattress comprising hardness adjusting mats 30a and 30b having different hardnesses and different stacking orders, which are disposed on the right and left parts of the mattress, respectively, as shown in Fig. 6. The double mattress is similar in the construction and operation thereof to the previously described single mattress except that the double mattress has the hardness adjusting mats 30a and 30b disposed on the right and left parts of the mattress, respectively, and that the hardness adjusting mats 30a and 30b have combination forms different from each

other based on the physical characteristics of the user. Accordingly, detailed description of the construction and operation of the double mattress will not be given.

Second preferred embodiment

5           As shown in Fig. 7, a mattress according to a second preferred embodiment of the present invention comprises a base mat 10, which forms a lower part of the mattress. A guide matt 20 is attached to the base mat 10 along the upper edges thereof. In an inner space defined by the  
10       guide matt 20, a plurality of hardness adjusting block mats 60 with different hardnesses are arranged side by side on the base mat 10. The arranging order of the hardness adjusting block mats 60 may be changed based on the physical characteristics of the user. On the hardness  
15       adjusting block mats 60 is disposed a mattress cover 50 for shielding the hardness adjusting block mats 60 and the guide matt 20 so that any displacement of the hardness adjusting block mats 60 is prevented.

          The base mat 10, the guide matt 20, and the mattress  
20       cover 50 of this embodiment are similar in the constructions and operations thereof to the base mat 10, the guide matt 20, and the mattress cover 50 of the previous embodiment of the present invention. Accordingly, detailed description of the constructions and operations of  
25       the base mat 10, the guide matt 20, and the mattress cover 50 of this embodiment will not be given.

          In this embodiment, the mattress includes a plurality of the hardness adjusting block mats 60 with different hardnesses. The hardness adjusting block mats 60 arranged  
30       side by side on the base mat 10 in the inner space defined by the guide matt 20. On the top surface of each of the hardness adjusting block mats 60 is marked a hardness indicating symbol so that the user can quickly and easily recognize hardness of the hardness adjusting block mats 60.

35       With the hardness adjusting block mats 60, hardness of the mattress can be easily adjusted on the basis of the

physical characteristics of the user only by changing the arranging order of the hardness adjusting block mats 60. Specifically, the hardness adjusting block mats 60 with high hardness are disposed on the lumbar contact portion of the mattress, which requires high hardness, and the hardness adjusting block mats 60 with low hardness are disposed on other contact portions of the mattress, which require low hardness, to adjust the hardness of the mattress. Consequently, the hardness of the mattress can be more minutely adjusted if sizes of the hardness adjusting block mats 60 are reduced and levels of the hardness are increased.

As described above, the hardness adjusting block mats 60 can be partially replaced on the basis of the physical characteristics of the user to adjust the hardness of the mattress. Consequently, the present invention eliminates a drawback that the whole mattress of the user must be replaced as time goes by, as in the case where the user is a child or a teenager in a growth period as in the prior art.

In order to prevent any displacement of the hardness adjusting block mats 60 due to an external shock, velcro strips 11 are preferably attached to the bottom surfaces of the hardness adjusting block mats 60 and the top surface of the base mat 10, on which the hardness adjusting block mats 60 are arranged in contact with the base mat 10, respectively. In this way, an adhesive force between the hardness adjusting block mats 60 and the base mat 10 by virtue of the velcro strips 11 prevents the displacement of the hardness adjusting block mats 60 due to external shock. Besides, as shown in Fig. 8, each of the hardness adjusting block mats 60 may have toothed longitudinal sides 61 for preventing the displacement of the hardness adjusting block mats 60 due to external shock. In this way, one of the hardness adjusting block mats 60 is securely engaged with a neighboring hardness adjusting block mats 60 by means of



their respectively engaging toothed longitudinal sides 61, whereby the displacement of the hardness adjusting block mats 60 is prevented.

Although the user can change the arranging order of the hardness adjusting block mats 60 by himself/herself to adjust the hardness of the mattress as described above, the mattress according to the present invention further comprises a computer program and a handbook, both of which provide the user with optimum values of the hardness of the hardness adjusting block mats 60 and optimum arrangement forms of the hardness adjusting block mats 60 based on the physical characteristics of the user so that the user can adjust the hardness of the mattress more accurately.

The computer program comprises a data storing unit for storing optimum combination forms of the hardness adjusting block mats 60 based on the physical characteristics of the user, an input unit for inputting his/her physical characteristics by the user, a controller for comparing the physical characteristics of the user inputted from the input unit with the data stored in the data storing unit to search for an arrangement form of the hardness adjusting block mats 60 suitable to the physical characteristics of the user, and an output unit for displaying the arrangement form searched by the control means so that the user may see the arrangement form.

The physical characteristics of the user inputted from the input unit are principal factors for determining hardness of the hardness adjusting block mats 60, which are identical to those of the first preferred embodiment of the present invention. Accordingly, the principal factors of this embodiment will not be specified again.

If the computer is not available, the handbook can be effectively utilized. The handbook provides the user with optimum arrangement forms of the hardness adjusting block mats 60 based on the physical characteristics of the user. The user can search for an arrangement form of the hardness

adjusting block mats 60 suitable to his/her physical characteristics in the handbook to easily adjust hardness of the mattress.

5 In this way, it is possible for the user to accurately and quickly adjust hardness of the mattress suitable to his/her physical characteristics using the aforesaid computer program or the aforesaid handbook.

10 Although not shown, the present invention may be also realized by a double mattress comprising pairs of hardness adjusting block mats 60 having different hardnesses and different arranging orders, which are disposed on the right and left parts of the mattress, respectively. The double mattress is similar in the construction and operation thereof to the previous single mattress except that the  
15 double mattress has pairs of the hardness adjusting block mats 60 disposed on the right and left parts of the mattress, respectively, and that the pairs of hardness adjusting block mats 60 have arrangement forms different from each other based on the physical characteristics of  
20 the user. Accordingly, detailed description of the construction and operation of the double mattress will not be given.

Each of the hardness adjusting block mats 60 may have a plurality of pads 62 with different hardnesses, which are  
25 stacked one on top of another in the hardness adjusting block mats 60, as shown in Fig. 9. In this case, the hardness of the hardness adjusting block mats 60 is adjusted by changing a stacking order of the pads 62. Consequently, the number of kinds of the hardness adjusting  
30 block mats 60 with the pads 62 is remarkably reduced in comparison with the hardness adjusting block mats 60 without the pads 62.

#### Industrial Applicability

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As apparent from the above description, the present

invention provides a mattress with adjustable hardness comprising a plurality of hardness adjusting mats having different hardnesses and stacked one on top of another on a base mat in an inner space defined by a guide matt attached to the base mat, and a lumbar pad interposed between one of the hardness adjusting mats and a neighboring hardness adjusting mat, whereby a stacking order of the hardness adjusting mats and a position of the lumbar pad can be changed without replacing the whole mattress to easily adjust the hardness of the mattress.

In addition, the present invention provides a mattress with adjustable hardness comprising a plurality of hardness adjusting block mats having different hardnesses and arranged side by side on a base mat in an inner space defined by a guide matt attached to the base mat, whereby an arranging order of the hardness adjusting block mats can be changed to easily adjust the hardness of the mattress without replacing the whole mattress.

Furthermore, hardness of each of a head contact portion, a lumbar contact portion, and a leg contact portion of the mattress can be easily and conveniently adjusted by changing a position of the lumbar pad and replacing the hardness adjusting block mats with new ones having different hardnesses.

Since a mattress with desired hardness can be provided by changing a stacking order of the hardness adjusting mats and the lumbar pad or an arranging order of the hardness adjusting block mats, the mattress according to the present invention can be manufactured in a small number of types thereof than the conventional mattress, whereby production, storing, distribution, and a user's selection of the mattress are simple and convenient.

Moreover, it is possible for the user to accurately adjust hardness of the mattress suitable to his/her physical characteristics using a computer program or a handbook.

Although the preferred embodiments of the present invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

## Claims:

1. A mattress with adjustable hardness, comprising:  
a base mat, the base mat forming a lower part of the  
5 mattress;  
a guide matt attached to the base mat along the upper  
edges thereof;  
a plurality of hardness adjusting mats stacked one on  
top of another on the base mat in an inner space defined by  
10 the guide matt, the hardness adjusting mats having  
different hardnesses, the hardness of the mattress being  
adjusted by changing a stacking order of the hardness  
adjusting mats;  
a lumbar pad interposed between one of the hardness  
15 adjusting mats and a neighboring hardness adjusting mat;  
and  
a mattress cover for shielding the hardness adjusting  
mats and the guide matt.
- 20 2. The mattress as set forth in claim 1, wherein each  
of the hardness adjusting mats has position marks for  
indicating portions of the mattress where a head and legs  
of a user are laid, respectively, a hardness indication for  
indicating a degree of hardness of the mattress, and  
25 guidelines for indicating positions for disposing the  
lumbar pad based on the height of the user when seated, the  
position marks, the hardness indication, and the guidelines  
being indicated on the top surface of each of the hardness  
adjusting mats.
- 30 3. The mattress as set forth in claim 1, further  
comprising:  
a computer program; and  
a handbook for providing the user with optimum  
35 combination forms of the hardness adjusting mats and the  
lumbar pad based on the physical characteristics of the

user,

wherein the computer program comprises:

data storing means for storing optimum combination  
forms of the hardness adjusting mats and the lumbar pad  
5 based on the physical characteristics of the user;

input means for inputting his/her physical  
characteristics by the user;

control means for comparing the physical  
characteristics of the user inputted from the input means  
10 with the data stored in the data storing means to search  
for a combination form of the hardness adjusting mats and  
the lumbar pad suitable to the physical characteristics of  
the user; and

output means for displaying the combination form  
15 searched by the control means so that the user may see  
the combination form.

4. A mattress with adjustable hardness, comprising:

a base mat, the base mat forming a lower part of the  
20 mattress;

a guide matt attached to the base mat along the upper  
edges thereof;

a plurality of hardness adjusting block mats arranged  
side by side on the base mat in an inner space defined by  
25 the guide matt, the hardness adjusting block mats having  
different hardnesses, the hardness of the mattress being  
adjusted by changing an arranging order of the hardness  
adjusting block mats; and

a mattress cover for shielding the hardness adjusting  
30 block mats and the guide matt.

5. The mattress as set forth in claim 4, wherein each  
of the hardness adjusting block mats has a plurality of  
pads stacked one on top of another therein, the pads having  
different hardnesses.

6. The mattress as set forth in claim 4 or 5, wherein each of the hardness adjusting block mats has toothed longitudinal sides so that one of the hardness adjusting block mats is engaged with a neighboring hardness adjusting  
5 block mats by means of their respectively engaging toothed longitudinal sides.

7. The mattress as set forth in claim 4, further comprising:

a computer program; and  
10 a handbook for providing the user with optimum arrangement forms of the hardness adjusting block mats having different hardnesses based on the physical characteristics of the user,

wherein the computer program comprises:  
15 data storing means for storing optimum arrangement forms of the hardness adjusting block mats having different hardnesses based on the physical characteristics of the user;

input means for inputting his/her physical  
20 characteristics by the user;

control means for comparing the physical characteristics of the user inputted from the input means with the data stored in the data storing means to search for an arrangement form of the hardness adjusting block  
25 mats suitable to the physical characteristics of the user; and

output means for displaying the arrangement form searched by the control means so that the user may see the arrangement form.  
30

8. The mattress as set forth in claim 1 or 4, further comprising a zipper, velcro strips, or a fastener attached to one side of the outer circumference of the mattress cover and the corresponding side of the outer circumference  
35 of the base mat for detachably joining the mattress cover

to the base mat.

5        9. The mattress as set forth in claim 1 or 4, wherein the guide matt is made of cushion materials having hardness of 20 kg/314 cm<sup>2</sup> to 70 kg/314 cm<sup>2</sup> and a width of 5 mm to 150 mm, the value of the hardness being a 25 % indentation load deflection (ILD) measured according to the provision of JIS-K-6401.



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FIG.1

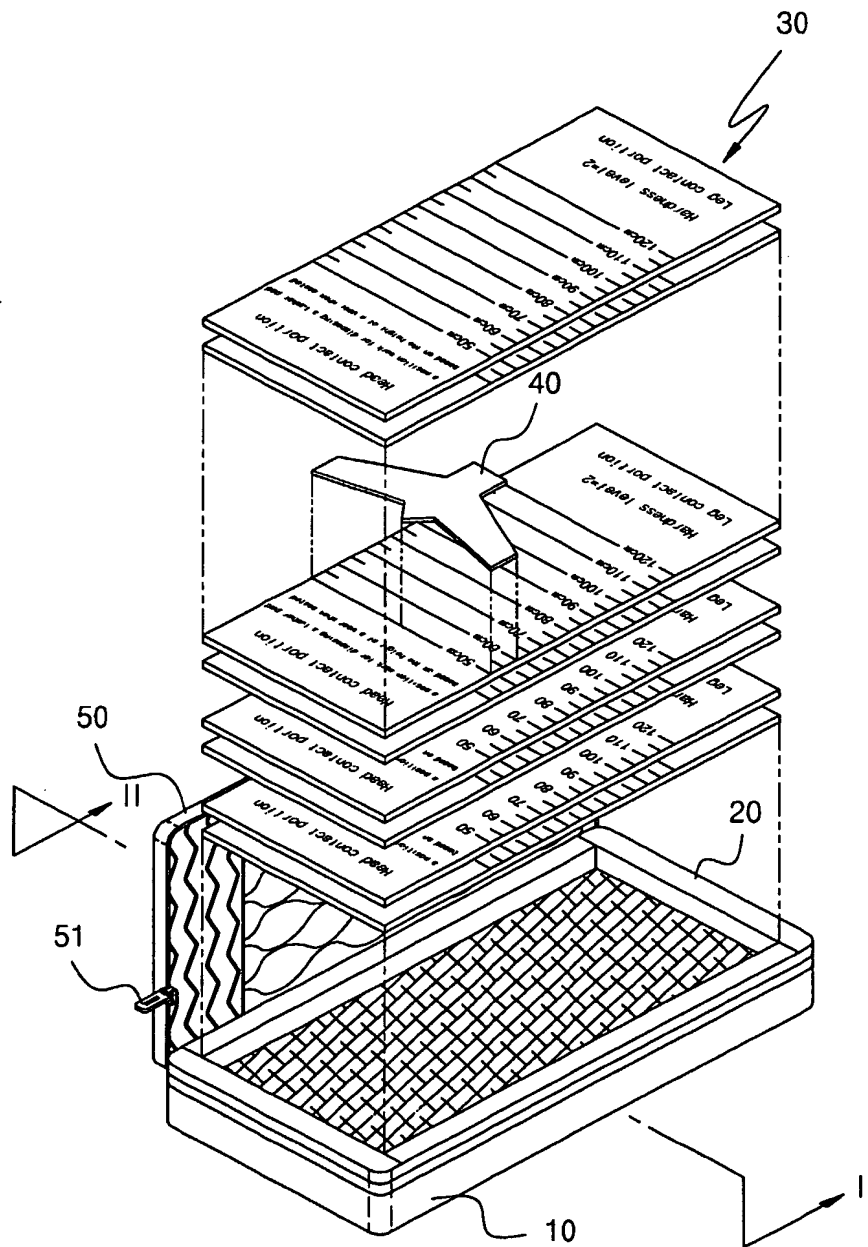


FIG.2

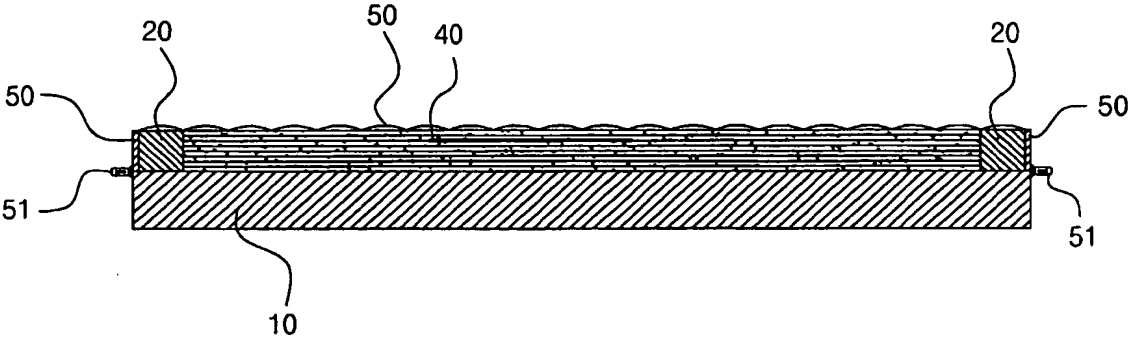


FIG.3

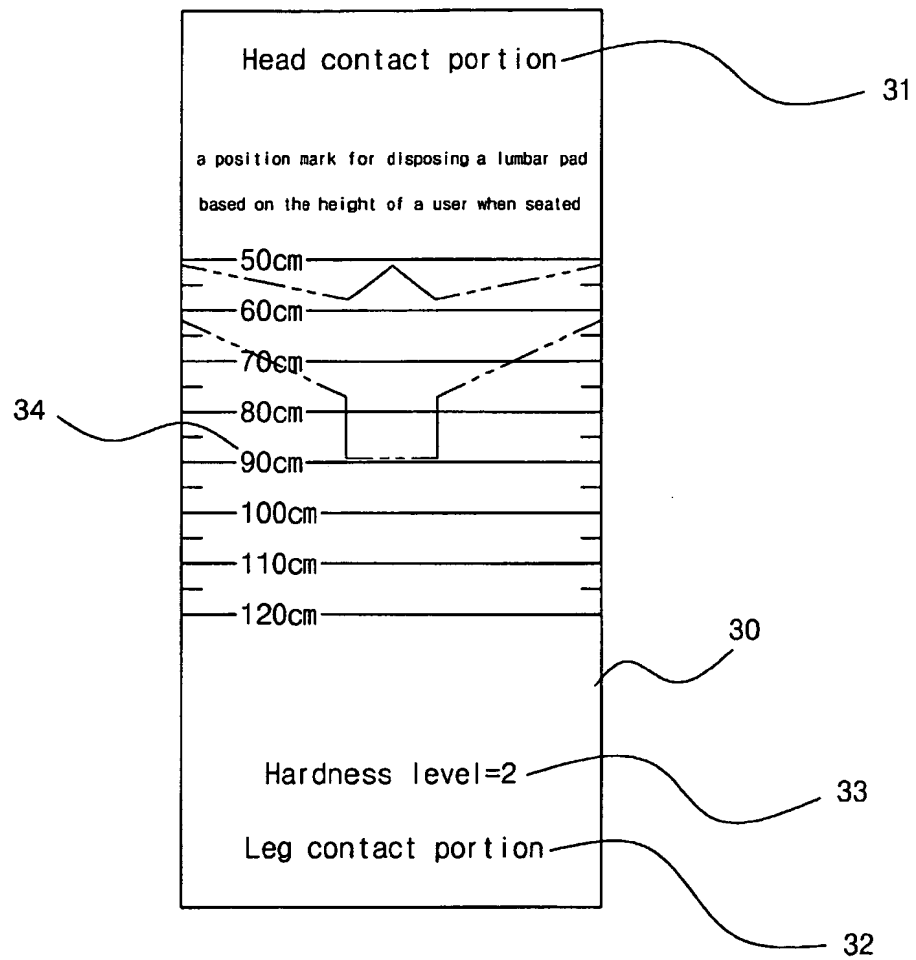


FIG.4

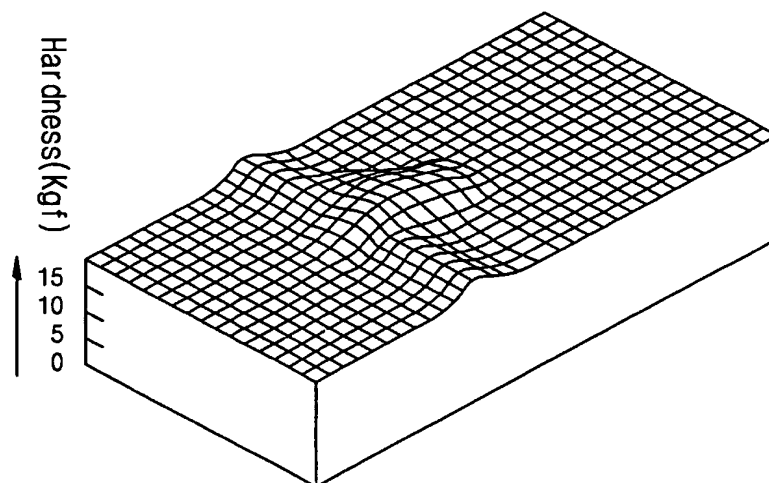


FIG.5

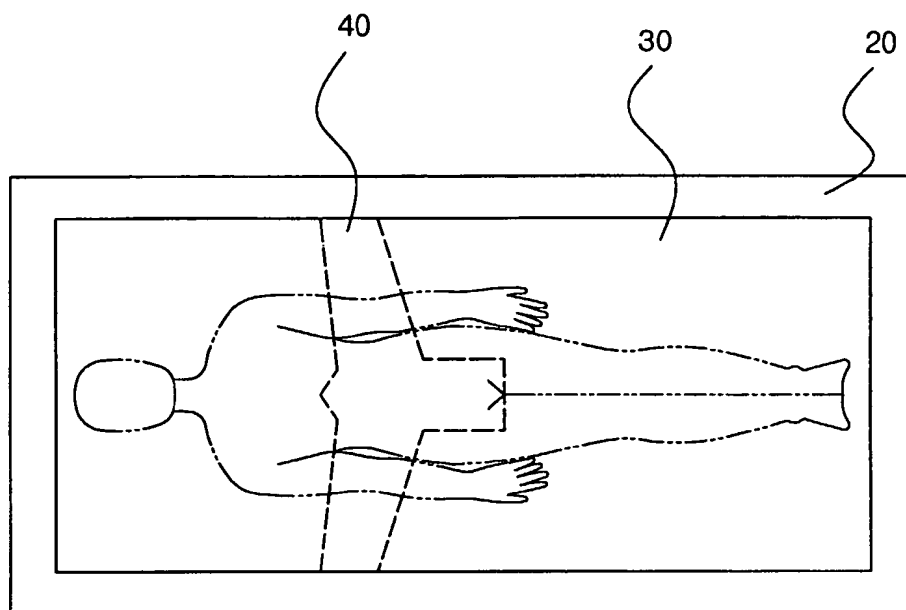
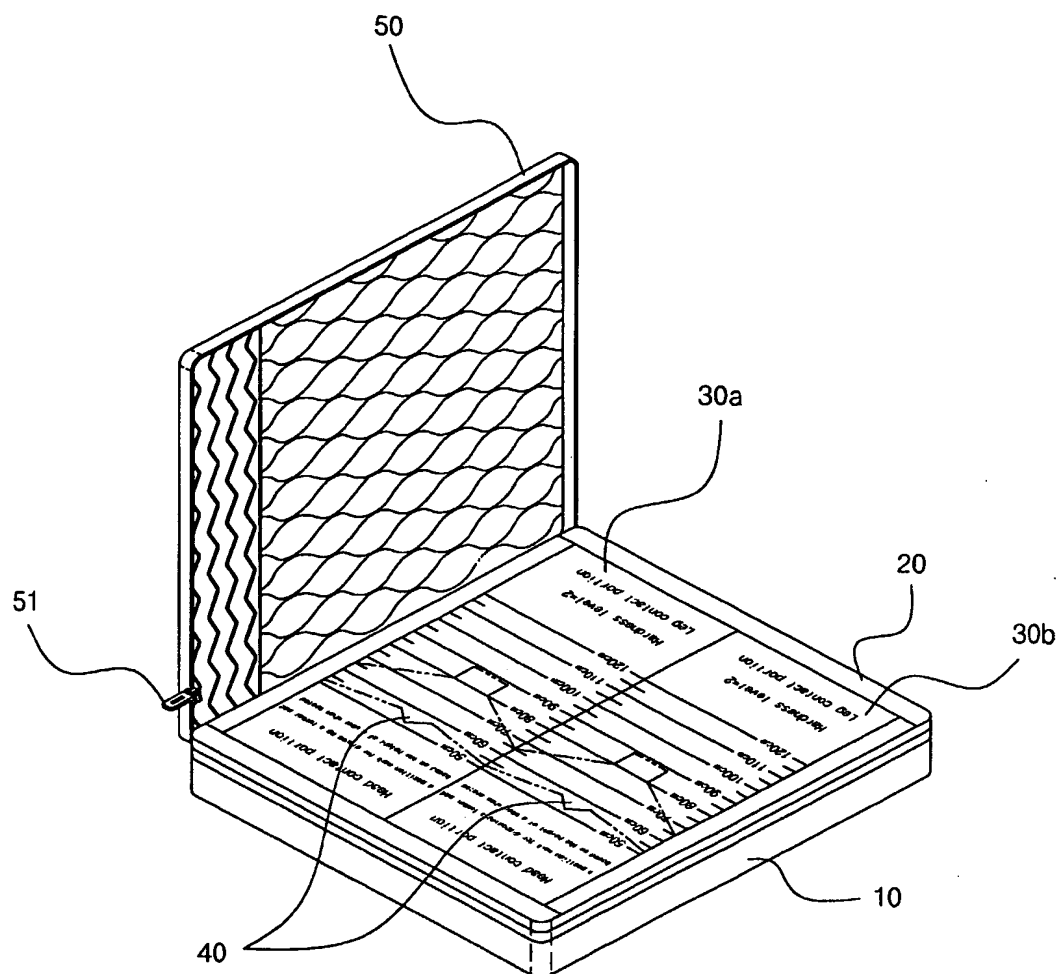


FIG.6



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FIG.7

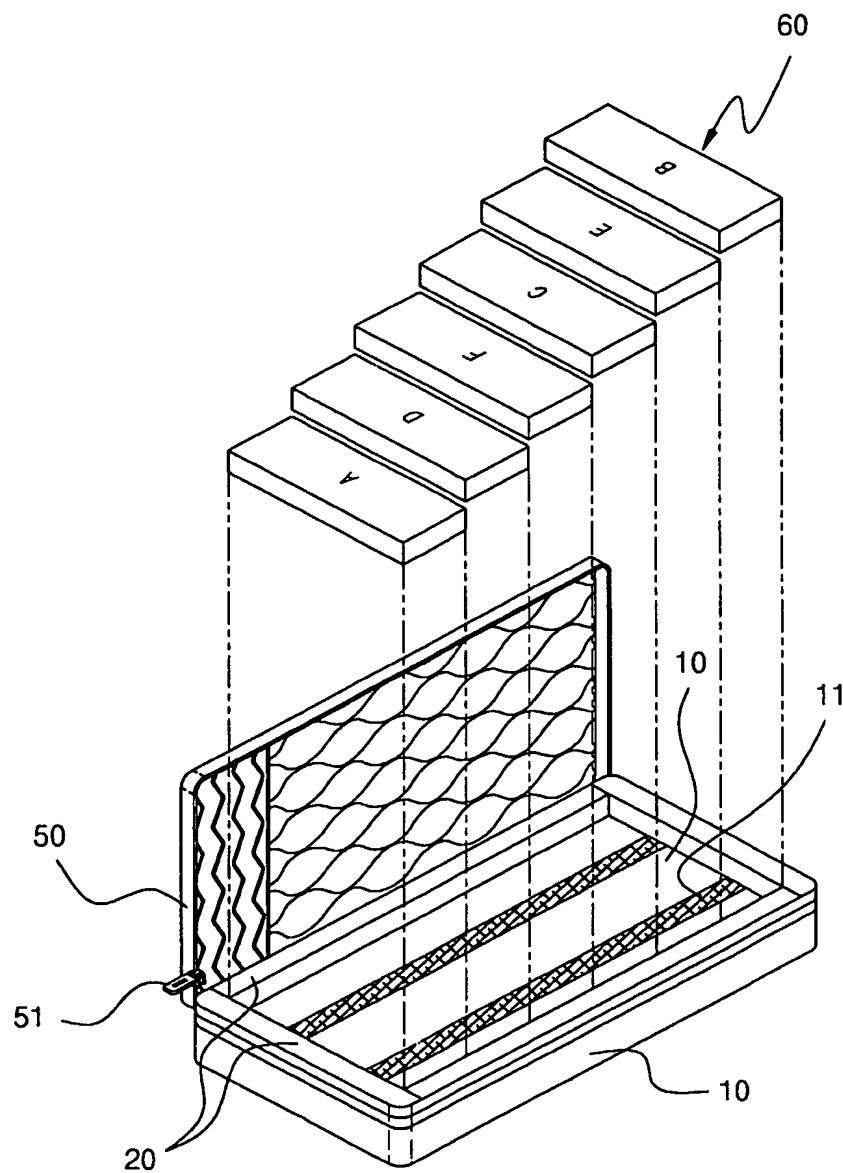


FIG.8

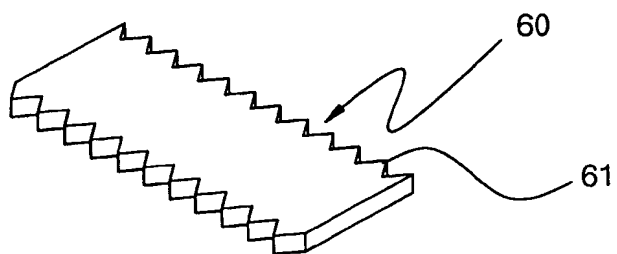




FIG.9

